Indiana IREAD-3 and ISTEP+ Statewide Readiness Test
Incident Summary Report
January 25, 2016

Executive Summary

At 10:00 am last Wednesday, January 20, the IDOE and Pearson conducted a Statewide Readiness Test (SRT) as part of annual preparations for online delivery of the Spring 2016 IREAD-3 and ISTEP+ assessments. This testing is an important part of the IDOE's and Pearson's collective commitment to providing the smoothest operational testing experience possible by verifying ahead of time that vendor systems and local infrastructure are properly configured and ready to support the high volumes that will be experience during live testing. While we recognize there were difficulties with this test, we have done significant work since that time to identify and rectify the issues reported to us.

During last week's test, students initially experienced difficulties logging in as the result of the Amazon Web Services (AWS) hosting configuration Pearson uses to support its online testing systems. Once identified, the issue was quickly corrected, allowing testing to continue smoothly the following day. As a result, we are confident that our hosting environment will be ready to support a successful Spring 2016 administration. To provide further assurance that the issues experienced last Wednesday morning will not reoccur, we will conduct an additional Statewide Readiness Test Friday January 29th.

Incident Overview and Corrective Actions Taken

Shortly after last week's Statewide Readiness Test began, some students across the state experienced difficulty logging in, with many receiving a wide variety of error messages indicating connectivity issues with the Pearson server. However, after repeated attempts to log in, by approximately 10:20 most students were able to begin their test and most were able to complete it within the one hour allotted. By the end of the day, we had recorded 96,205 successful logins.

After conducting a thorough investigation, we have concluded with 100% certainty that the issues experienced, as reported to us, were related to the Elastic Load Balancers (ELB) that are utilized within the Amazon Web Services (AWS) for TestNav. The ELB is designed to route and distribute incoming traffic to backend systems, and can dynamically and independently scale in response to increases in traffic.

Pearson's past practice during Spring 2015 testing had been to contact AWS to ask for the ELB to be "pre-warmed" (i.e., configuring the load balancer to appropriate levels based on expected traffic). However, over the last several months, our own internal testing and live customer experience have shown that Amazon's ELB has been able to handle significant demand without requiring "pre-warming". In fact, between December 1 and January 22nd TestNav has delivered approximately 2 Million tests with no ELB pre-warming, and since the end of peak testing in 2015, TestNav has delivered over 5.5 Million tests with no pre-warming.

With the release of TestNav 8.5 in December 2015, Pearson introduced another AWS technology known as CloudFront to our hosting architecture. CloudFront is a content delivery web service that provides a mechanism for distributing content to end users with low latency and high data transfer speeds. CloudFront also absorbs a significant amount of the load and sits in front of the ELB.

During the January 20th Statewide Readiness Test, a large spike in traffic was noted and, even with the introduction of CloudFront, Amazon's ELB took time to ramp up to keep up with load (it should be noted that the ELB scales dynamically and there was no manual intervention required). As a result, the ELB was not able to automatically scale fast enough to meet such a high demand in such a short timeframe, resulting in significant delays for students logging in. However, within the span of 20 minutes, the ELB was able to catch up and as previously mentioned, most students were able to continue with testing. In short, it was not the volume of tests that caused the AWS and ELB services to fall behind, but rather the speed at which those volumes were reached.

On the evening of January 20, as a precaution, we asked AWS to pre-warm the ELB for the following day, when additional high volumes from SRT makeups were anticipated due to weather delays. As we observed on Thursday, this step allowed testing to proceed without the kinds of reported issues that occurred during the first 20 minutes on Wednesday, and by the end of the day we had recorded a total of 53,261 student logins.

After examining several working theories and conducting a thorough search of our system logs, on Friday, January 22 Pearson Assessment Technology Engineering (ATE) confirmed that the aforementioned conditions within the AWS environment had led to the testing challenges that students experienced, as reported to us through the IDOE, our Indiana Help Desk, our online administrative system (PearsonAccess^{next}) and the Hoosier Educational Computer Coordinators (HECC) listserv. Specifically, we were able to confirm conditions that would have resulted in

types of events reported between 10:00am and 10:30am EST. We were also able to estimate that these conditions likely affected up to 13% (9,931 of 71,658) of active testers.

As a result of this confirmation, Pearson has now established a mandate for all testing to be preceded by a pre-warming of the AWS Elastic Load Balancers, regardless of anticipated volume or spikes in traffic, and this pre-warming will now be carried out as standard for all Indiana online testing going forward.

This episode, although highly disruptive to students and troubling to staff, has provided valuable experience and insight into the AWS configuration needed to meet Indiana's needs. To instill confidence in our ability to meet Indiana's online testing needs, we propose to conduct an additional Statewide Readiness Test for Friday, January 29 at 10am.

We sincerely regret the disruption to students and staff during last week's SRT, and we recognize the significant commitment of local resources required to participate in the SRT. With the additional measures we have enacted, we are confident that this confirming SRT will be successful and ultimately lead to successful online administration of the IREAD-3 and ISTEP+ assessments this spring.